

WABULAROO NAUGHTONI GEN. ET SP. NOV., AN ENIGMATIC KANGAROO
(MARSUPIALIA) FROM THE MIDDLE TERTIARY CARL CREEK LIMESTONE
OF NORTHWESTERN QUEENSLAND.

RESULTS OF THE RAY E. LEMLEY EXPEDITIONS, PART 4

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ABSTRACT

Wabularoo naughtoni gen. et sp. nov. is a middle to late Miocene kangaroo from the Carl Creek Limestone of Riversleigh Station, northwestern Queensland. The dentary morphology is potoroid-like but the molars are lophodont and therefore macropodid-like; the very large plagiaulacoid premolar shares characters of both groups. Its systematic and phylogenetic position are obscure. Although it may be structurally ancestral to either the potoroids or macropodids it post dates the appearance of both families in the fossil record.

Wabularoo gen. nov.

TYPE SPECIES: *Wabularoo naughtoni* gen. et sp. nov.

GENERIC DIAGNOSIS: It differs from all genera of the Potoroidae (*Hypsiprymnodon*, *Propleopus*, *Potorous*, *Caloprymnus*, *Bettongia* and *Aepyprymnus*) in having lophodont molars. It differs from all genera of the Macropodidae in having a combination of a short, shallow, swollen dentary with a greatly enlarged masseteric canal and a trenchant but wide and tall plagiaulacoid P₃. Of all known macropodid genera, it most closely resembles the monotypic *Hadronomas* but it also differs from the single species of this genus (*H. puckridgei*) as follows: the molars have narrower anterior cingula; the P₃ is proportionately much wider and taller-crowned, obliquely oriented in the tooth row, narrowed posteriorly, with recurved more numerous and finer serrations, and no buccal or lingual cingula.

Origin of the generic name: *Wabula* (wa'bula) means 'long-time-ago' in the Waanyi language as spoken by Ms Ivy George of Riversleigh Station; *roo* is a common non-specific Australian term for

Tedford (1967) summarizes the Riversleigh fauna from the Miocene Carl Creek Limestone noting three diprotodontid genera including *Bematherium angulum* Tedford 1967, and an undetermined genus of kangaroos. In 1976, the author and museum assistants Messrs H. Godthelp and R. Kohout made further collections from the Carl Creek limestone at the locality referred to by Tedford (1967, figs. 1-2) as 'D'. These collections included two additional genera of kangaroos, as well as crocodiles, birds, and diprotodontids.

The new kangaroo described here was found in an isolated block of the very hard Carl Creek Limestone. Using an electric jack-hammer, it was collected as part of a smaller chunk of limestone. Fine preparation was carried out in the laboratory using a compressed-air vibrotool.

Terminology of individual teeth follows Archer (1978a) and that of crown morphology follows Archer (1976a, b) or Bensley (1903). Registration numbers prefixed with F are in the palaeontological collections of the Queensland Museum.

SYSTEMATICS

Superfamily: MACROPODOIDEA
Family: Incertae sedis

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a kangaroo. The generic name is regarded to be masculine.

***Wabularoo naughtoni* sp. nov.**
(Fig. 1; Pls., 1, 2)

HOLOTYPE: Queensland Museum F9177, broken right dentary with P₃, M₂₋₃, and part of M₄.

TYPE LOCALITY: From an isolated boulder of the upper clastic arenaceous limestone member of the Carl Creek Limestone, site 'D' (of Tedford 1967), Riversleigh Station, northwestern Queensland.

AGE: The absolute age is unknown but, based on faunal comparisons, the Carl Creek Limestone is interpreted to be mid to late Miocene in age (Tedford 1967, Archer and Bartholomai 1978).

ORIGIN OF THE SPECIES NAME: In honour of Mr and Mrs E. Naughton, owners of Riversleigh Station, who graciously allowed us to work on the property as well as extended many kindnesses to us during our stay.

DIAGNOSIS: That of the genus until additional species are known.

DESCRIPTION: The dentary is potoroine-like resembling for example *Bettongia* and *Aepyprymnus* in being short, heavy-bodied, with a marked inflection of the ventral border below the molar row, a prominent swelling of the lateral wall below P₃, and a large and laterally swollen masseteric canal. The point of inflection of the ventral border is below M₄ as in some

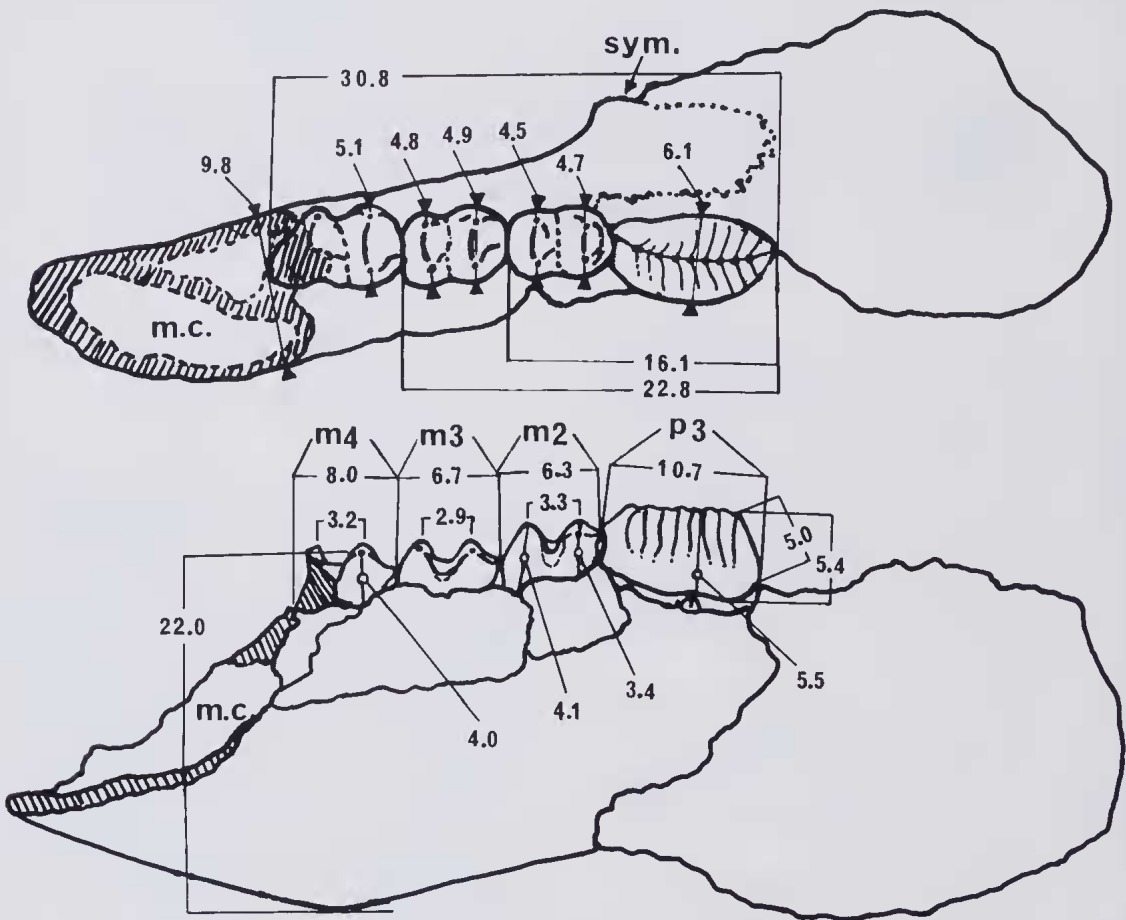


FIG. 1. Occlusal and buccal views of F9177, the holotype of *Wabularoo naughtoni*, showing measurements (in mm) and tooth nomenclature. In the buccal view, the intercuspal distances 3.2, 2.9 and 3.3 were measured between the metaconid (lingual end of the protolophid) and entoconid (lingual end of the hypolophid) of each lower molar. In measurements involving length of the broken M₄, the posterior point is taken from the posterior edge of the posterior root. In measurements involving length of the P₃, the anterior edge is taken from the antero-most basal edge of the enamel. Molar widths were measured along axes passing transversely through the major cusps. Molar cusp heights involve only the protoconid (buccal end of the protolophid) and hypoconid (buccal end of the hypolophid). Abbreviations: *m.c.*, masseteric canal in section; *sym.*, posterior end of the symphysis.

macropodids rather than below M_3 as in potoroids (when it occurs). The symphysis, although damaged, appears to extend posteriorly to the level of the trigonid of M_2 .

P_3 : This tooth is missing a small piece of enamel from the lingual face and a small piece from the basal anterolingual corner. Its morphology resembles the plagiulacoid teeth of some potoroids such as *Aepyprymnus* and some macropodids such as *Hadronomas* but differs from these in that its occlusal outline is narrowed posteriorly, markedly swollen mesially, and again narrowed anteriorly. There is no evidence of basal cingula although the basal rim of the crown is buccally and lingually swollen. There are nine cuspules along the longitudinal crest, at least eight of which are the terminal points of paired buccal and lingual vertical crests. Only potoroids have this many serrations, the highest number in macropodids being approximately seven (in *Hadronomas*). These vertical crests in *Wabularoo naughtoni* are sinuously curved on both sides of the tooth, but more complexly so on the buccal side. This type of curving is also pronounced in some potoroids, particularly *Propleopus*, but is not apparent in macropodids with serrated premolars perhaps because of their relatively brachydont premolar crowns. The vertical crests terminate occlusally in a subhorizontal longitudinal shearing crest. This crest also extends down the anterior and posterior ends of the crown. The posterior end of the crown is inflected lingually so that the longitudinal crest also turns lingually and contacts M_2 at the lingual edge of its anterior cingulid. This type of inflection is common in potoroids and macropodids. The buccal face of the tooth is approximately planar while the lingual side is mildly concave. This marked difference is not noticeable in macropodids but is in some potoroids. The whole tooth is set obliquely in the tooth row such that its anterior end is buccal to the longitudinal midline of the molar row. This is a characteristic of many potoroids but no macropodids.

M_2 : This tooth is missing a piece of enamel from the lingual corner of the metaconid and some of the thin enamel on the posterior face of the hypolophid. It is low-crowned and broadly resembles molars of the simpler low-crowned macropodids such as *Setonix* and *Dorcopsoides*. The four major cusps are all subequal in height. A preprotocristid or paracristid connects the protoconid to the anterior edge of the anterior cingulid. The anterior cingulid is high, being

higher than the midlink. The protolophid, although worn, shows a slight median flexure suggesting either a median vertical swelling such as occurs in some potoroids, a median crest such as occurs in the M_1 of some *Dendrolagus*, or a medially curved or interrupted crest such as occurs in potoroids. The protolophid is apparently not anteriorly concave, being more or less transverse and horizontal, a condition uncommon in most macropodids (exceptions include *Dorcopsis*), but common in potoroids and sthenurines. The midlink or cristid obliqua is low and intersects the rear of the protolophid well buccal to its midpoint, a condition universal in potoroids but uncommon in most macropodids other than some of the low crowned forms such as *Dorcopsis*. The preprotocristid isolates a smaller buccal from a larger lingual region of the anterior cingulid. This character varies in most kangaroo subfamilies but its presence is more common in macropodines and sthenurines. The buccal median valley between the midlink, protoconid and hypoconid is transversely concave. The hypolophid is concave anteriorly, and with wear is also occlusally concave. The occlusal concavity is assymmetric, the point of maximum concavity being lingual to the midpoint. There is no evidence of a posterior cingulum or cingular pocket on the posterior flank of the hypolophid. The metaconid is connected to the anterior cingulid by a lingual crest. The remnant of this crest suggests it turned buccally immediately anterior to the metaconid and then turned sharply lingually to form the anterolingual edge of the tooth. This character differs from a superficially similar condition in *Hadronomas* where there is a notch between the metaconid and the anterolingual edge of the cingulid, because in *Hadronomas* there is no crest linking the metaconid to the anterior cingulid, and the notch is near the base of the metaconid rather than up its flank as in *Wabularoo naughtoni*. The condition of the crest anterior to the metaconid also sets *W. naughtoni* apart from some of the otherwise similar low-crowned macropodids such as *Dendrolagus* because it evidently does not terminate immediately anterobuccal to the metaconid. No longitudinal linking crest connects the metaconid to the entoconid. There was evidently a short crest or swelling developed anterior to the entoconid such as occurs (but to a greater extent) in *Dorcopsis*, *Dorcopsulus* and *Dendrolagus*. The protolophid is markedly narrower than the hypolophid. The trigonid and talonid are subequal in width. The widest part of the tooth is across the anterior part of the midvalley.

M_3 : The morphology of M_3 is as in M_2 except as follows: The whole tooth is larger; the protolophid is subequal in length to the hypolophid; the protolophid is symmetrically concave anteriorly and occlusally; the crest extending anteriorly from the metaconid to the anterior cingulid does not have an inflection immediately anterior to the metaconid; the anterior cingulid is lower such that its anterior edge is no higher than the midvalley of the tooth; the trigonid is noticeably wider than the talonid and is the widest part of the tooth; the anterior cingular shelf is longer; the swelling anterior to the entoconid is not as well-developed; and there is a poorly-developed but distinct lingual vertical crest on the posterior flank of the metaconid (this may also have been present in M_2 , but the tooth is very worn in this area).

M_4 : The hypoconid and posterior face of the hypolophid are missing. The morphology of M_4 is as in M_3 except as follows: There is a point of inflection between the anterolingual corner and the end of the anterior cingulid and the base of the metaconid; the anterior flank of the entoconid is not extended by a swelling, but rather projects anteriorly.

Meristic gradients along the tooth row: The protolophid and trigonid increase in width from M_2 to M_4 ; the hypolophid and talonid also increase in width at least from M_2 to M_3 ; the preprotocristid increases in length from M_2 to M_4 ; the anterior cingulid decreases in height from M_2 to M_4 ; and the protoconid increases in mass from M_2 to M_3 , but is subequal in M_3 and M_4 .

DISCUSSION

Wabularoo naughtoni is in most characters except molar morphology, a decidedly potoroid-like kangaroo. Its lophodont molars which also lack posterior cingula are however decidedly non-potoroid-like characters. Its systematic and phylogenetic position within the Macropodoidea are therefore very much in doubt.

Wabularoo naughtoni could theoretically represent any one of at least five evolutionary stages: (1) a potoroid developing into a macropodid; (2) a macropodid developing into a potoroid; (3) a specialized macropodid paralleling potoroids; (4) a specialized potoroid paralleling macropodids; (5) a representative of an as yet unrecognized group equivalent in rank to known kangaroo subfamilies but a derivative or ancestor of none of the other known groups. However, at least one undoubted potoroid occurs in the

mid-Miocene Etadunna Formation (M. O. Woodburne, pers. comm.) and at least one high-crowned macropodid tooth is known from the mid-Miocene Namba formation from the Frome Embayment of South Australia (Archer and Rich, in preparation). These probably older occurrences discount the first two of the above possibilities. There is at present insufficient information to decide between the remaining three.

Speculations about kangaroo evolution and classification have been going on continuously since Bensley's (1903) comparative study of the teeth of marsupials. More recent speculation concerning the relative primitiveness of the known subfamilies (e.g. Pearson 1950, Ride 1971, Bartholomai 1972) has highlighted the fact that there is still no agreement about whether potoroids were ancestral to macropodids, macropodids were ancestral to potoroids, or both groups were derived independently from a common ancestor referable to neither group. There has even been renewed interest and uncertainty about the composition of the subfamilial groups (e.g. Woodburne 1967, Kirsch 1968, Archer 1978b). Elsewhere (Archer 1978b) I have proposed a speculative rearrangement of all kangaroo genera into two families: The Potoroidae containing the Hypsiprimnodontinae (*Hypsiprimnodon* and *Propleopus*) and the Potoroinae (all other potoroid genera); and the Macropodidae containing the Sthenurinae (possibly including the genera *Sthenurus*, *Procoptodon*, *Setonix*, *Dorcopsoides*, *Dorcopsulus*, *Dendrolagus* and *Hadronomas*) and the Macropodinae (containing all other previously described genera). The Sthenurinae, in the expanded form used by Archer (1978b), is essentially a plesiomorphic group and probably not monophyletic.

There are other different and as yet unnamed middle Miocene Kangaroos, from central South Australia (M. O. Woodburne, pers. comm.) that cannot be referred to any of the previously described subfamilies without significantly altering the current concepts of these subfamilies. There is a possibility that *Wabularoo naughtoni* and these other aberrant taxa are referable to a fifth subfamily of kangaroos. I have not proposed a new subfamily for *W. naughtoni* because of the limited information provided by the single dentary. It would be desirable to consider incisor and cranial structure as well, aspects of which are preserved in the Miocene material under study by M. O. Woodburne.

The diprotodontids of the Riversleigh local fauna were concluded by Tedford (1967) to be contemporaneous with or slightly younger than

the Ngapakaldi diprotodontids from the Etadunna Formation. Pollens from the Etadunna Formation are regarded to be Batesfordian to Balcombian in age (pers. comm. from W. K. Harris in Callen and Tedford 1976). Therefore it can be suggested that the Riversleigh local fauna is probably middle to late Miocene in age.

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PLATE 1

Wabularoo naughtoni gen. et sp. nov., holotype F9177 × 2

FIG. A: Stereophotograph postero-occlusal view, showing P₃-M₄. The
hopolophid of M₄ is broken.

FIG. B: Stereophotograph, occlusal view.

FIG. C: Stereophotograph, lingual-occlusal view.

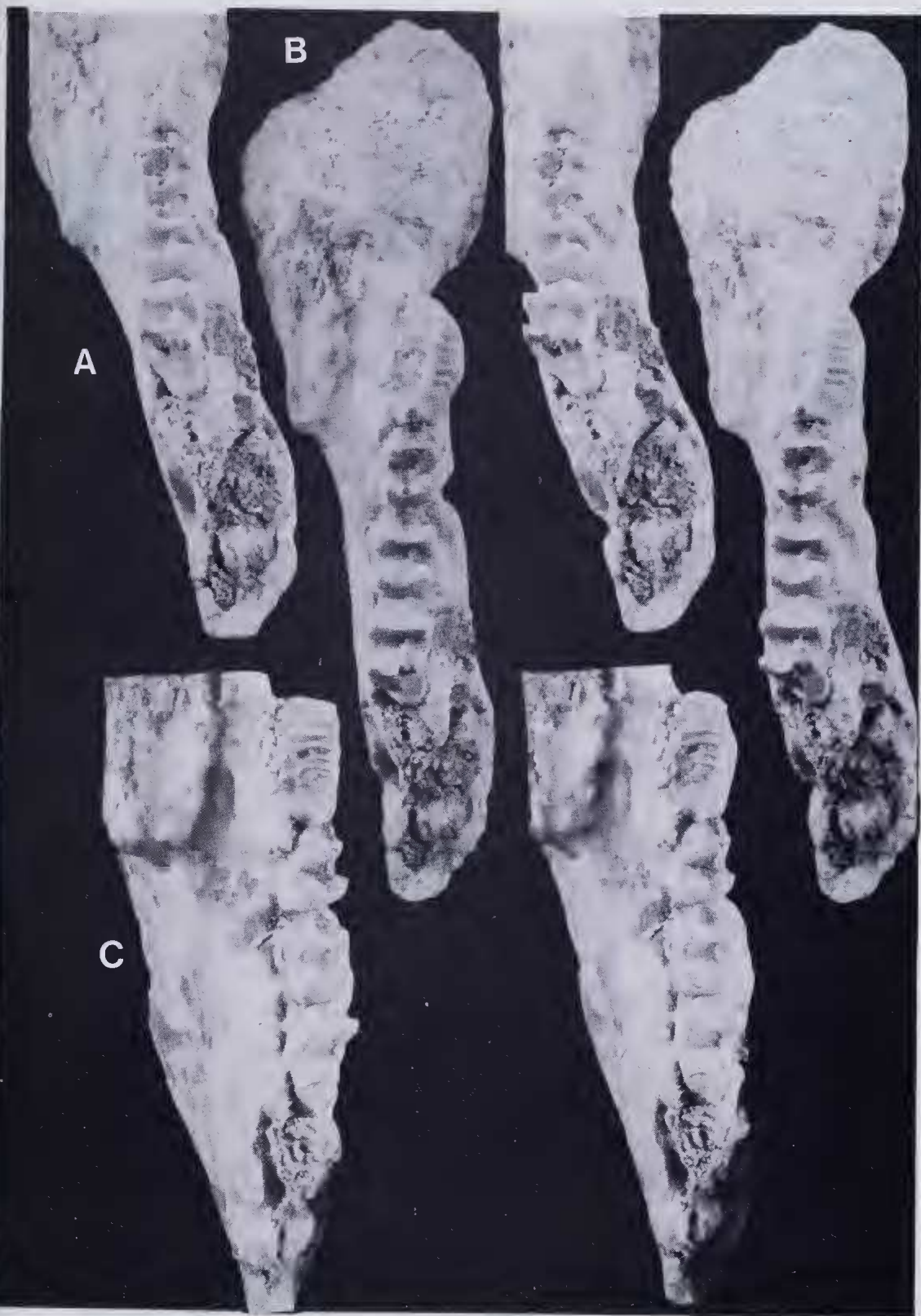


PLATE 2

Wabularoo naughtoni gen. et sp. nov., holotype F9177 × 2.

FIG. A: Stereophotograph, antero-occlusal view.

FIG. B: Stereophotograph, buccal-occlusal view.

FIG. C: Buccal view.

FIG. D: Lingual view.

